

Evaluating electronic medical record implementation using the HOT-FIT model at UPTD Puskesmas Ungaran

Novi Ika Kurniawati¹, Wahyu Wijaya Widiyanto²

^{1,2}Department of Applied Health Information Management, Politeknik Indonusa Surakarta, Surakarta, Jawa Tengah, Indonesia

ARTICLE INFO

Article history:

Received Mar 28, 2025

Revised Apr 4, 2025

Accepted Apr 11, 2025

Keywords:

Digital Health Adoption
Electronic Medical Records
Hot-Fit Model
Primary Healthcare
System Evaluation

ABSTRACT

This study evaluated the implementation of Electronic Medical Records (EMR) at UPTD Puskesmas Ungaran using the Human-Organization-Technology Fit (HOT-FIT) model. The research employed a descriptive qualitative approach to explore how human readiness, organizational support, and technological infrastructure influenced EMR adoption. Data were collected through in-depth interviews, observations, and document analysis involving twelve healthcare professionals. Thematic analysis revealed that most users had limited training and lacked confidence in using the system, often leading to partial documentation. Organizationally, there was minimal supervision, unclear standard operating procedures, and no internal technical support. Technologically, the system frequently experienced downtime and integration failures with national platforms such as Pcare BPJS. These findings indicate that the EMR implementation remains fragmented and procedural, rather than transformative. The study concluded that the success of EMR adoption requires not only system availability but also holistic readiness across all HOT-FIT dimensions. Practical recommendations include ongoing capacity-building, improved policy enforcement, and user-centered system development. This study provides insight for policymakers and healthcare managers to enhance EMR sustainability in primary care settings.

This is an open access article under the [CC BY-NC](https://creativecommons.org/licenses/by-nc/4.0/) license.



Corresponding Author:

Wahyu Wijaya Widiyanto,
Department of Applied Health Information Management,
Politeknik Indonusa Surakarta,
Jl. Palem No. 8 Jati, Cemani, Grogol, Kabupaten Sukoharjo, Jawa Tengah, Indonesia,
Email: wahyuwijaya@poltekindonusa.ac.id

INTRODUCTION

The digital transformation in healthcare has become an urgent need to enhance service efficiency, data accuracy, and patient satisfaction (Melliasari, Dwiyono, Purwadhi, & Widjaya, 2024). At the frontline of primary care, community health centers (Puskesmas) play a critical role in ensuring accessible and integrated health services, especially in developing countries like Indonesia (Djati, 2023)(Addinni, 2023). One of the core pillars of digital health transformation is the implementation of the Electronic Medical Record (EMR) system, which replaces paper-based documentation with structured, secure, and accessible digital records (Andhani et al., 2024)(Nurdiani, 2024).

Despite its many benefits, the successful implementation of EMR requires more than just technological readiness. It involves the complex interplay between users, the organization's culture, and the system itself. Many healthcare facilities face challenges such as insufficient IT infrastructure, resistance from health workers, and gaps in training and policy support (Vitrapratama, n.d.), (Pomeo & Winarti, 2024). These factors often result in partial or hybrid adoption, where paper and digital systems coexist, leading to inefficiencies and potential data loss (Evi, 2023)(Evi, 2023).

To understand these challenges holistically, the Human-Organization-Technology Fit (HOT-FIT) model is increasingly used as a framework to evaluate the alignment between technological features, human readiness, and organizational support. Studies have shown that a misfit in any of these elements can hinder digital health initiatives, especially in settings with limited resources (Yusof, Papazafeiropoulou, Paul, & Stergioulas, 2008). Therefore, evaluating EMR implementation using this framework provides a comprehensive insight into real-world barriers and enablers, particularly in Puskesmas which are at the frontline of Indonesia's healthcare system.

This study focuses on UPTD Puskesmas Ungaran, a primary healthcare center in Semarang Regency, which began implementing EMR in 2024. However, the adoption process remains hybrid due to recurring technical and organizational challenges, such as limited IT personnel, unstable infrastructure, and inconsistent compliance among health workers. By applying the HOT-FIT model, this research aims to identify the specific factors influencing the success and sustainability of EMR in this setting.

The novelty of this study lies in its context-sensitive evaluation of EMR from multiple stakeholder perspectives within a Puskesmas environment. Unlike many studies focused on hospital-level digitalization, this research highlights the unique obstacles faced by primary care services in rural-urban transition areas. The findings are expected to offer practical recommendations for improving EMR implementation, strengthening digital readiness, and ensuring continuity of care through better data management and system integration.

RESEARCH METHOD

This study employed a descriptive qualitative approach to explore the implementation of Electronic Medical Records (EMR) at UPTD Puskesmas Ungaran using the HOT-FIT model. The research was conducted from January to June 2025 and focused on investigating the alignment between human, organizational, and technological aspects in the real-world application of digital health systems. A qualitative method was selected to capture the in-depth perspectives of health professionals, management, and technical staff involved in the EMR ecosystem (Creswell & Creswell, 2017).

Research Design

The research adopted a case study design centered on a single public health facility that had recently transitioned into using EMR. The HOT-FIT model served as the conceptual framework, comprising three main components: Human, Organization, and Technology. Each of these dimensions was operationalized into specific indicators based on previous literature (DeLone & McLean, 2003).

The workflow of the study can be illustrated in the following figure 1 and figure 2 that describes the flow of analysis from data collection to conclusion:

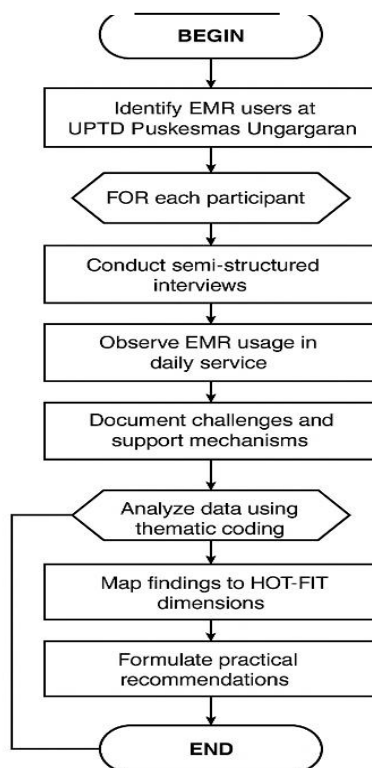


Figure 1. Research process

From figure 1. HOT-FIT Evaluation Framework, this figure illustrates the HOT-FIT model used as the theoretical framework in this study. The model consists of three interrelated components—Human, Organization, and Technology—each comprising critical factors that influence the success of health information systems implementation. (a) The Human component includes user satisfaction, system use, and user competence. (b) The Organization component reflects structure, environment, and support within the institution. (c) The Technology component encompasses system quality, information quality, and service quality. (d) This framework enables researchers to assess the multidimensional alignment necessary for effective Electronic Medical Record (EMR) adoption.

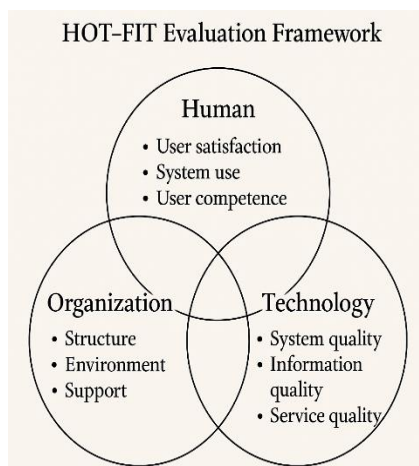


Figure 2. HOT-FIT evaluation framework

From figure 2. Flowchart of Research Procedure, this flowchart depicts the detailed sequence of the research procedure implemented in this study. The process begins with identifying EMR users at UPTD Puskesmas Ungaran. Each participant undergoes a series of steps including semi-structured interviews and observational analysis of EMR usage during routine service. Challenges and support mechanisms are documented in the field.

Following data collection, the researcher applies thematic coding (Braun & Clarke, 2006) to analyze qualitative patterns. Findings are then mapped to the HOT-FIT framework dimensions, leading to the formulation of practical recommendations for improving EMR implementation in primary care settings.

This systematic structure ensures both methodological transparency and alignment with qualitative research standards

Research Procedure and Data Collection

- a. Participants, twelve health professionals were selected using purposive sampling based on their involvement in EMR activities. The participants included two doctors, four nurses, two midwives, one pharmacist, one laboratory staff, and two medical record officers.
- b. Data Collection Techniques, data were gathered through: (a) In-depth interviews using a semi-structured guide aligned with HOT-FIT dimensions. (b) Direct observations of EMR usage, focusing on workflow, system interactions, and bridging with Pcare BPJS. (c) Document analysis, including internal SOPs, error logs, and organizational policies on EMR.
- c. Data Validation, triangulation was applied across sources (interview, observation, document) and methods (time-separated sessions) to ensure data validity and consistency (Fryer & Dinsmore, 2020).

Data Analysis

Thematic analysis was used following Braun & Clarke's six-step framework: familiarization, coding, generating themes, reviewing themes, defining themes, and reporting. The themes were categorized according to the HOT-FIT model as shown in Table 1.

Tables and Figures are presented center, as shown in Table 1 and Figure 1, and cited in the manuscript before appeared.

Table 1. Theme classification based on HOT-FIT components

Component	Emerging Themes
Human	Training needs, system usability
Organization	Management support, SOP clarity
Technology	System errors, bridging limitations

Ethical Considerations

All participants gave informed consent, and their anonymity was maintained throughout the study. Ethical approval was obtained from the institutional research committee prior to data collection.

RESULTS AND DISCUSSIONS

This study explored the implementation of Electronic Medical Records (EMR) at UPTD Puskesmas Ungaran through the lens of the HOT-FIT model, focusing on the alignment between human factors, organizational support, and technological readiness. The results, drawn from interviews with twelve healthcare professionals and supported by direct observations and institutional documents, reveal critical insights into the strengths and limitations of EMR adoption in a primary care setting.

Human Dimension: Perceptions, Competence, and Challenges

The readiness and perception of health workers toward EMR were diverse yet thematically consistent. Most informants appreciated the vision behind digitalization but faced personal and practical limitations in their daily use of the system. Out of the twelve participants, only two had received any structured training prior to EMR implementation. As a result, most learned to operate the system informally, often through peer support or trial-and-error during work hours.

A nurse (N1) reflected, "*Saya belajar sendiri dari teman, karena belum pernah ada pelatihan resmi sejak EMR diterapkan.*" Another (N3) admitted, "*Kalau pas ramai pasien, saya nulis dulu di kertas. Sistem kadang lambat, takut pasien nunggu lama.*" These testimonies underline that the transition to EMR is not merely technical but deeply rooted in the day-to-day realities of public service delivery.

Observations confirmed that health workers often skipped non-mandatory fields due to time pressure. On average, only about 65% of the data fields were completed per patient record, indicating a disconnect between expected system use and actual practice. The hybrid model—partially digital, partially manual—led to duplicated efforts and increased the risk of inconsistencies.

Although five informants expressed confidence in using basic EMR functions, such as registration and diagnosis entry, only three were familiar with advanced features like referral management or inter-facility data sharing. This gap reflects a broader issue in many health facilities: digital tools are introduced faster than the users' capacity to adapt to them. In short, EMR adoption at Puskesmas Ungaran remains partial and superficial due to limited training, high workload, and lack of user-friendly features.

Organizational Dimension: Policy, Supervision, and Support Mechanisms

Organizational support plays a decisive role in digital transformation success. At Puskesmas Ungaran, leadership had demonstrated early initiative by mandating EMR usage and introducing system SOPs. However, this formal readiness was not mirrored in operational practices. Only one out of twelve respondents was aware that SOPs for EMR even existed. For most, there was no orientation or guideline beyond informal verbal instructions.

A bidan (B2) stated candidly, "*Saya baru tahu kalau ada SOP penggunaan EMR, belum pernah dikasih tahu sebelumnya.*" Meanwhile, the medical records officer (RM2) commented, "*Kalau error kami lapor ke vendor lewat WA. Kadang harus kirim screenshot, tunggu lama baru dibalas.*"

One of the most significant organizational gaps was the absence of in-house IT support. All technical issues were escalated to third-party vendors, which caused delays in service when system errors occurred. Moreover, there was no routine evaluation or quality control on how staff used EMR. Without feedback loops or user performance monitoring, there was little motivation to comply with documentation standards or improve data completeness.

Leadership commitment was present in principle but lacked structured reinforcement through supervision, incentives, or infrastructure. Consequently, staff perceived EMR as an additional task rather than a core clinical tool. The absence of reward or accountability systems created a culture where minimal compliance was the norm, not the exception.

Technological Dimension: System Functionality and Integration

The EMR system in use is designed to integrate with national platforms such as SIMPUS and Pcare BPJS. However, users reported frequent bridging issues, particularly during high-traffic days such as Mondays. Eight out of twelve informants noted that patient data inputted into SIMPUS often failed to sync with Pcare in real time. This glitch necessitated duplicate data entry and sometimes led to skipped documentation altogether when time constraints were tight.

A physician (D1) shared his experience: "*Kadang sudah input data di SIMPUS, tapi tidak masuk di Pcare. Harus diulang dari awal, itu makan waktu banget.*" These errors not only disrupted workflow but also undermined confidence in the system.

Downtime was another major issue. Field notes recorded at least four instances in a month when the system was inaccessible for over thirty minutes. During such events, staff reverted to paper-based documentation and faced additional burdens re-entering data once the system was restored.

The system also lacked key features necessary for full digital documentation. For instance, informed consent forms, patient education sheets, and general agreements still required wet signatures and manual filing. The absence of an electronic signature module made full transition to digital records impossible. These manual dependencies highlight the system's limited capacity to accommodate evolving clinical and legal requirements of modern healthcare.

Cross-Dimensional Insights and Implications

Taken together, the findings from all three HOT-FIT dimensions suggest that the EMR implementation at Puskesmas Ungaran remains fragmented. The system exists, and the policy mandates its use, but the alignment between human readiness, organizational infrastructure, and technological capabilities is weak.

The EMR has yet to become an integral part of clinical culture. For most users, it functions as a reporting obligation rather than a supportive tool. The lack of systemic alignment has led to a routine where digital and manual methods coexist uneasily, often resulting in inefficiencies and confusion.

To move forward, the facility must take deliberate steps to rebalance the three dimensions of HOT-FIT. This includes structured digital literacy programs, internal technical support, leadership-driven performance monitoring, and investment in system upgrades that address real-world user needs. Without these, EMR adoption will remain procedural rather than transformative.

CONCLUSION

The findings of this study confirm that the implementation of Electronic Medical Records (EMR) at UPTD Puskesmas Ungaran has yet to reach its full potential due to gaps in human readiness, organizational support, and technological infrastructure. As highlighted in the Introduction, the research aimed to evaluate the success of EMR using the HOT-FIT framework, and the results demonstrate a consistent misalignment across its three core dimensions.

Human factors, particularly in terms of digital literacy and user confidence, remain a primary challenge. The absence of structured training and the persistence of high workload pressures have resulted in partial and inconsistent use of the system. From an organizational perspective, while policies exist on paper, they have not been effectively communicated or enforced. Leadership support is still reactive rather than proactive, with minimal supervision or quality control in EMR documentation. Technologically, the system suffers from recurring bridging errors, limited integration with national platforms, and an inability to accommodate critical features such as electronic signatures.

Despite these limitations, the presence of a digital foundation is a promising start. The study offers a clear direction for future development: prioritizing regular capacity-building for health workers, embedding EMR practices into organizational routines, and upgrading the system to be more user-centric and interoperable.

Looking forward, the application of the HOT-FIT model in similar primary care contexts can provide valuable insights for refining digital health strategies. Further research may explore EMR implementation in multiple Puskesmas with varied resource levels to develop a scalable and context-sensitive roadmap for nationwide EMR adoption. With strong institutional commitment and continued evaluation, EMR has the potential to significantly improve the quality, efficiency, and continuity of healthcare services in Indonesia.

ACKNOWLEDGEMENTS

The author would like to express sincere gratitude to the management and staff of UPTD Puskesmas Ungaran for their cooperation and openness during the research process. Special thanks are also extended to the academic supervisors at Politeknik Indonusa Surakarta for their valuable guidance and feedback throughout this study. This research would not have been possible without the support of fellow students, colleagues, and family who provided moral encouragement and logistical assistance.

References

- Addinni, T. (2023). Peranan Penting Keterlibatan Masyarakat terhadap Penyelenggaraan Pelayanan Kesehatan sebagai Subsistem Upaya Kesehatan di Indonesia. *Researchgate, December*.
- Andhani, A. Z., Ramalinda, D., Jayadi, Y. Y., Pramudianto, A., Rahayu, T., Sutisna, T., ... Raharja, A. R. (2024). *Dasar-Dasar Rekam Medis: Panduan Praktis untuk Pemula*. Penerbit Kbm Indonesia.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101.
- Cranford, S. W. (2020). Seven Seconds or Less: Buzzworthy Titles in the Era of MOFs and Tinder. *Matter, 3*(4), 965-967.
- Cronje, J. C. (2020). Designing Questions for Research Design and Design Research in e-Learning. *Electronic Journal of E-Learning, 18*(1), 13-24.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of Management Information Systems, 19*(4), 9-30.
- Djati, S. P. (2023). *Manajemen Strategis dalam Pelayanan Kesehatan Masyarakat*. Indonesia Emas Group.
- Evi, T. (2023). *Transformasi Transaksi Tunai ke Digital di Indonesia*. CV. AA. Rizky.
- Fryer, L. K., & Dinsmore, D. L. (2020). The Promise and Pitfalls of Self-report: Development, research design and analysis issues, and multiple methods. *Frontline Learning Research, 8*(3), 1-9.
- Grieshaber, S. (2020). Equity and research design. In *Doing early childhood research* (pp. 177-191). Routledge.
- Handayani, P. W., Hidayanto, A. N., Ayuningtyas, D., Budi, I., & Kusnanto, H. (2019). Acceptance model of a hospital electronic medical record system based on an extended technology acceptance model. *BMC Medical Informatics and Decision Making, 19*(1), 1-10.
- Melliasari, H., Dwiyo, I., Purwadhi, P., & Widjaya, Y. R. (2024). Digital Leadership Skill dan Peranannya Bagi Kepemimpinan Institusi Pelayanan Kesehatan di Era Digital. *Syntax Idea, 6*(9), 4055-4063.
- Mulyadi, H., Setyawan, A., & Lestari, I. (2022). Workload and information system adoption among Indonesian nurses. *Journal of Health Informatics in Developing Countries, 16*(1), 15-24.
- Mulyana, M., Situmorang, M., & Fatikasari, S. (2023). Evaluasi Sistem Informasi (Electronic Medical Record) dengan Metode HOT-Fit terhadap Mutu Pelayanan Kesehatan. *Jurnal Rekam Medis dan Informatika Kesehatan, 13*(1), 21-30.
- Nugroho, H. (2020). Kesiapan Tenaga IT di Puskesmas: Tantangan dan Peluang. *Jurnal Sistem Informasi Kesehatan, 5*(2), 44-50.
- Nurdiani, T. (2024). Tanggung Jawab Hukum Rumah Sakit terhadap Perlindungan Kerahasiaan Medis dalam Pengelolaan Data Rekam Medis Elektronik. Universitas Muhammadiyah Malang.
- Pomeo, W. R. R., & Winarti, E. (2024). Dinamika Implementasi Kebijakan Penempatan Tenaga Kesehatan di Daerah Terpencil: Tantangan dan Realitas Lapangan. *Jurnal Kesehatan Tambusai, 5*(1), 2309-2329.
- Rahmawati, E., & Susanto, D. (2022). Accuracy of medical data in electronic versus paper-based records. *Asian Pacific Journal of Health Informatics, 10*(2), 33-40.
- Saragih, M., & Novimariono, N. (2020). An Experimental Study of The Effectiveness PEOW MODEL Through Applying Quartet Card in Teaching English Writing. *Indonesian Journal of Education, Social Sciences and Research (IJESSR), 1*(1), 32-40.
- Shu, K., Mahudewaran, D., Wang, S., Lee, D., & Liu, H. (2020). Fakenewsnet: A data repository with news content, social context, and spatiotemporal information for studying fake news on social media. *Big Data, 8*(3), 171-188.

- Sittig, D. F., & Singh, H. (2010). A new sociotechnical model for studying health information technology in complex adaptive healthcare systems. *Quality & Safety in Health Care*, 19(3), i68–i74.
- Vitrapratama, R. (n.d.). Analisis kepuasan pengguna aplikasi tije menggunakan metode end user computing satisfaction (eucs). Fakultas Sains dan Teknologi UIN Syarif Hidayatullah Jakarta.
- Yusof, M. M., Papazafeiropoulou, A., Paul, R. J., & Stergioulas, L. K. (2008). Investigating evaluation frameworks for health information systems. *International Journal of Medical Informatics*, 77(6), 377–385.